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DEVELOPING PROPER ATTITUDES TOWARD EYE PROTECTION IN THE SCHOOL SHOP, A RESEARCH REPORT.

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TWO METHODS OF IMPLEMENTING SCHOOL SHOP EYE PROTECTION PROGRAMS WERE INVESTIGATED TO DETERMINE THE MORE EFFECTIVE FOR DEVELOPING FAVORABLE AND LASTING STUDENT ATTITUDES. TWO INDEPENDENT SAMPLES, TOTALING 76, WERE DRAWN FROM THE TENTH GRADE VOCATIONAL MACHINE SHOP STUDENTS AND FROM COLLEGE STUDENTS ENROLLED IN AN ENGINEERING MACHINE SHOP COURSE. THE EXPERIMENTAL, CONTROL, AND FORCED GROUPS AT BOTH AGE LEVELS WERE GIVEN (1) A TAPE-RECORDED INTRODUCTION TO EYE SAFETY, (2) A PRETEST ATTITUDE SCALE, (3) SAFETY GLASSES, AND (4) A POST-TEST ATTITUDE SCALE. AFTER THEY WERE GIVEN SAFETY GLASSES, THE EXPERIMENTAL GROUP WAS SHOWN A FILM, "IT'S UP TO YOU." THE FORCED GROUP WAS REQUIRED TO WEAR SAFETY GLASSES IN THE SHOP FULL-TIME. THE FILM PRODUCED NO SIGNIFICANT ATTITUDE CHANGE IN THE EXPERIMENTAL GROUP. THERE WAS NO SIGNIFICANT ATTITUDE CHANGE IN THE FORCED GROUPS. SUPPLEMENTARY TECHNIQUES ARE NEEDED IF SIGNIFICANT FAVORABLE AND LASTING CHANGES IN ATTITUDE ARE TO BE ACHIEVED. A FILM REACTION SURVEY FORM, A FORM FOR EVALUATING SAFETY GLASSES, AND A TALLY SHEET FOR RECORDING THE NUMBER OF STUDENTS WEARING SAFETY GLASSES ARE INCLUDED. (EM)

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DEVELOPING PROPER ATTITUDES TOWARD EYE PROTECTION IN THE SCHOOL SHOP

A Research Report
(Made possible by a grant from the College of Education Research Fund)

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DEVELOPING PROPER ATTITUDES TOWARD EYE PROTECTION IN THE SCHOOL SHOP

School shop safety plays an increasing role in our modern-day educational thinking. A recent survey of local directors of vocational-industrial education throughout Pennsylvania (Schaefer, 1960) places the problem of identification and proper use of safety devices for the various vocational-industrial training areas high on the list of problems needing study. As the work force of the nation advances, so will the rate of occurrence of eye injuries and other disabling injuries. Unless we improve on our past record, it is inevitable that about a quarter million more disabling injuries will occur in 1965 than were suffered in 1957 (U.S. Department of Labor, 1958).

These figures strike cold when it is realized that one out of every one hundred boys and girls, 14 to 19 years of age who are now entering the labor force, will die as a result of a work injury; six will suffer a permanent impairment; and seventy will experience one or more disabling work injuries before reaching retirement. In other words, only 13 out of the 100 will complete their working lives without a work injury (U. S. Department of Labor, 1958).

No wonder, then, the astute leadership of industrial education in Pennsylvania is concerned with the whole problem of school shop safety.

The Problem

The problem was to investigate various methods of implementing school shop eye protection programs so as to develop a favorable and lasting attitude on the part of students toward eye protection throughout their working careers.

In its broadest sense, the problem was concerned with developing favorable attitudes toward the use of eye protective devices. As safety behavior is a personal matter, those who get hurt are probably 95% responsible for their own injuries. Therefore, the individual's attitude toward eye protection is of major importance if he is to survive the rigorous test of avoiding injury in not only the school shop but throughout his working career.

The problem, defined more narrowly, was related to ways of implementing an eye protection program in a school shop. To ignore some form of eye protection in the quasi industrial surroundings of a school shop appears to the researchers to be tantamount to inviting tragedy. Yet school shop eye protection varies greatly from school to school and from shop teacher to shop teacher.

Major Hypothesis

It was hypothesized that a voluntary method of implementing an eye protection program, when properly reinforced, would develop the greatest change in student attitude and result in wearing eye protection devices 100% of the time in the school shop.

The initial shock of individual observation when an accident occurs usually stimulates increased safety consciousness. Accordingly, the reinforcement variable in this study consisted of a vivid color movie titled, "It's Up To You," which depicted the necessary medical treatment and painful results of an eye injury as

obtained in industry. The movie print was made available through the Penn State Film Library and was produced by the National Society for the Prevention of Blindness.

Sub Hypotheses

In addition, the following sub-hypotheses were postulated throughout the study: (1) if forced to wear safety glasses, individuals would develop a negative attitude toward the eye safety equipment, and (2) if left at their own volition, the student attitude would remain unchanged throughout the study.

The Method

The design made use of three parallel groups with samples selected from two independent populations. The study of each sample was staged in the realistic content of existing school shops on both the college and secondary school level.

The Sample

The secondary school sample consisted of forty (40) students enrolled in tenth grade vocational machine shop classes. High schools taking part in the study at this level were Berwick, Altoona, and Bellefonte.

The college sample was limited to thirty-six (36) students (both industrial arts and engineering students) who were taking a course in machine shop at The Penn State University.

The Treatment

The following study design was replicated with both samples.

Control group--The following steps were carried out:

1. an introduction was presented to the topic of eye safety by means of a tape recording;
2. administered the pre-test attitude scale;
3. distributed eye protection devices (individual safety glasses);
4. administered the post-test attitude scale at the end of a five-week period.

Experimental group--The experimental group received the same treatment as the control group except the reinforcement variable film, "It's Up To You," was presented after step number three.

Forced group--Treatment was the same as for the control group except students were forced to wear safety glasses 100% of the time while in the school shop.

As indicated, each individual taking part in the study was provided a pair of industrial type safety glasses or cover goggles for their personal use. Thus, each participant had no excuse for not wearing the necessary and approved eye protective devices during the shop activities.

Measuring Instruments

Two attitude scales (Secondary School and College Edition) of the Likert Summated Rating Type were constructed in experimental forms with the aid of tenth grade high school machine shop students and industrial arts teachers who were attending the summer term. These initial attitude scale forms were administered to a sample of 76 tenth grade high school students and 109 perspective industrial arts teachers enrolled at Oswego State College, New York. An analysis was made of each item on the original editions using Allen Edwards' technique in attitude scale construction (1957). Item tabulations were then made on a specially designed work sheet, Addendum A. The original secondary school scale of 64 items was reduced by the analysis to 44 items and the original college scale of 84 items was reduced to 60 items. Reliability coefficient as reproduced by the Kuder Richardson formula resulted in coefficients of .89 and .95 respectively. Copies of the revised attitude scales can be found in Addenda B and C.

In addition to the attitude scale development, a number of data collecting devices were constructed. These are as follows:

1. Film Reaction Survey (Addendum D)--A survey form designed to collect opinions regarding the film.

2. Safety Glass Survey (Addendum E)--A survey form constructed to provide responses regarding the safety glasses or cover goggles which were supplied as well as providing an opportunity to the respondents for comments about the experiment itself

3. Observation Check (Addendum F)--A form on which the teacher could record a daily check of how many students were wearing their safety glasses.

Results

As previously stated, the study design utilized replications with two independent samples. Therefore, the study data, whenever possible, are reported and analyzed together.

Pre-Test, Post-Test Attitude Change

Testing of the major hypothesis consisted of administering the two editions of the attitude scale on a pre-test and post-test basis as called for in the design.

TABLE I

Pre-Post Test Attitude Scale
Secondary School Sample

Group	N	Mean		Standard Deviation		"t"
		Pre-Test	Post-Test	Pre-Test	Post-Test	
Control	16	117.1	118.0	11.3	14.7	NS
Forced	10	129.7	116.0	13.8	17.8	NS
Experimental	14	106.0	110.0	13.4	17.7	NS
Total	40					

NS Not Significant

TABLE II

Pre-Post Test Attitude Scale
College Sample

Group	N	Mean		Standard Deviation		"t"
		Pre-Test	Post-Test	Pre-Test	Post-Test	
Control	11	143.5	145.8	16.6	15.6	NS
Forced	13	145.3	143.6	17.4	31.5	NS
Experimental	12	155.1	162.6	22.3	22.4	NS
Total	36					

NS Not Significant

It is obvious from the data in Tables I and II that the film, "It's Up To You," is not a panacea for developing favorable and lasting attitudes toward eye protection. Neither samples, secondary or college, showed a significant mean gain. The mean gain of the experimental groups as recorded by the two separate editions of the attitude scale was 4.0 for the secondary school sample and 7.5 for the college sample. These small gains were achieved over a five-week period for the college sample and a six-week period for the secondary school sample and could occur on the basis of chance variation. It is obvious from Tables I and II that the favorableness of attitude of the forced groups (those who were forced to wear the eye safety glasses) declined. The college sample mean attitude, when forced to wear safety glasses, declined 1.7 points and the secondary school sample declined 13.7 points. Here again the decline was not significant and could be attributed to chance.

In each sample, the control groups' mean attitude scores remained almost constant with the college sample gaining 2.3 and the secondary school sample increasing only 0.7 throughout the study.

Observed Check on Wearing Safety Glasses

An observational check of the actual percentage of time that the eye-safety glasses were worn by the participants in all of the groups was made to determine and compare attitude change with what was "said" and with what was "practiced". The study with the secondary school sample enlisted the teachers' cooperation in making a daily "spot check" of the number of students observed wearing the eye safety devices at different intervals throughout each day. The college sample made use of the observational check only once during the five-week study period.

TABLE III

Observed Check on Wearing Safety Glasses
Secondary School Sample

Group	N	Number Observations	Total No. Observed	Total No. Wearing Glasses	%	"t"
Forced	10	30	295	293	97	2.04*
Experimental	14	32	449	189	42	NS
Control	16	33	502	332	66	

* Significant at .05 level
NS Not Significant

TABLE IV

Observed Check on Wearing Safety Glasses
College Sample

Group	N	No. Observed Wearing Glasses	%	"t"	Comments
Forced	13	12	92	2.0*	One not wearing glasses was working on set-up.
Control	11	6	60	NS	
Experimental	9	8	89		One had cover on forehead.
Total	33				

* Significant at .05 level
NS Not Significant

Tables III and IV further indicate the limitations in practice of trying to develop an attitude with the single reinforcement variable (the film) used in this study. The forced groups in each case reported the highest rate of incidence of wearing the safety glasses. The secondary school forced groups were observed wearing their safety glasses 97% of the time and the college group 92% of the time. The secondary school control group wore their glasses 66% of the time and the college control group 60% of the time.

The experimental group of the secondary school sample had the poorest record of wearing safety glasses with only 42% of the students having them on at the time of thirty-two observations. The experimental group of the college sample was observed only once and at that time 89% of the students were utilizing their eye safety protection.

From the observation of actual practice, the forced groups in both samples had the highest rate of occurrence of wearing safety glasses. Significant differences between percentages were in favor of the forced groups when comparing with control groups.

Reaction to the Film

An attempt was made to secure student reaction to the film which was used as the reinforcement variable. The film represented a negative or "shock treatment" in that it shows an actual medical operation resulting from an eye injury. Reactions recorded from the film survey form are recorded in Table V.

Table V indicates strong endorsement of the film by both samples. The secondary school sample apparently "winced" somewhat more than the college sample as a total of 47% of the tenth graders admitted they turned away or closed their eyes sometime during the showing and 34% of the college sample did likewise. The table indicates that color is an important aspect of the film.

TABLE V

Film Reaction Survey
Secondary School and College Sample

Item	High School f	High School %	College f	College %
1. Should this film be shown to adult persons who work around machinery?				
Definitely should be shown	14	100	11	92
Probably should be shown	0	0	1	8
2. Should this film be shown to high school students who work in the school shop?				
Definitely should be shown	14	100	11	92
Probably should be shown	0	0	1	8
3. Should this film be shown to junior high school students who work in the school shop?				
Definitely should be shown	12	85	11	92
Probably should be shown	2	15	1	8
4. Did you close your eyes or turn away during the showing so as not to see certain parts of the film?				
Sometimes	1	7	1	8
Once in awhile	1	7	1	8
Hardly ever	4	30	2	18
Never	8	56	8	66
5. What do you think about using color in a film of this type?				
Definitely should be used	11	80	9	67
Probably should be used	1	7	3	33
Would make little difference	2	15	0	0
6. Do you think other such films should be made to point out the problem of safety in the shop?				
Definitely should be made	12	85	10	82
Probably should be made	2	15	2	18

After the study was completed, a more startling finding relative to this point took place at a showing of the film to three eleventh and twelfth grade industrial arts classes. It is reported that seven out of thirty-three of the viewing students apparently suffered adverse physical reaction from the showing. One of these actually fainted.

Reaction to Wearing Eye Protection

The safety glasses used throughout the study were of type and quality as issued by industry. Table VI shows the reaction of thirty-two students to six specific items asked about these safety glasses and/or cover goggles.

Sixty-three per cent of those wearing the glasses indicated they fit well, whereas, only forty-three per cent of those wearing the cover goggles responded in a like manner. Of those participants who did not feel the safety glasses fit well, sixty-seven per cent merely indicated in a general way that they were uncomfortable. Much the same complaint was issued by the users of the cover goggles.

The lenses of the glasses were satisfactory in 84% of the cases for the safety glasses but only 43% of the cases for the cover goggles. Those indicating lenses were not satisfactory for the cover goggles responded 100% to the item regarding how easily they could be scratched.

The style of safety glasses, which utilized side shields, was reported satisfactory by 77% of the respondents. The strongest objection was the difficulty in carrying them around as the side shields did not permit them to fold flat. The style of the cover goggles was found to be satisfactory by 57% of the participants with objection being registered regarding the difficulty of carrying them and the side shields preventing peripheral vision.

TABLE VI

Reaction to Wearing Safety Glasses and Cover Goggles
Secondary School Sample

Item	Safety Glasses		Cover Goggles	
	f	%	f	%
1. The glasses or covers fit well.				
Yes	20	63	3	43
No	12	37	4	57
2. If "no" in item #1, indicate the difficulty(s).				
a. they did not fit my nose	5	42	2	50
b. they pinched my ears	3	25	0	0
c. were uncomfortably heavy	2	17	0	0
d. irritated my skin	2	17	1	25
e. pinched my temples	1	8	0	0
f. were difficult to adjust	1	8	0	0
g. in general, were uncomfortable	8	67	2	50
3. The lenses were satisfactory.				
Yes	26	84	3	43
No	5	16	4	57
4. If "no" in item #3, indicate the difficulty(s).				
a. the lenses scratch easily	2	40	4	100
b. the lenses fog up	1	20	0	0
c. the lenses make eyes water	1	20	0	0
5. The style of safety glasses or covers was satisfactory.				
Yes	24	77	4	57
No	7	23	3	43
6. If "no" in item #5, indicate the difficulty(s).				
a. side shields prevent side vision	1	14	1	33
b. they were difficult to carry	3	43	1	33
c. I didn't look good in them	5	71	0	0
d. Other			Outside edges sharp. Made my skin hot.	

When comparing the attitude scores of those individuals whose safety glasses fit well with those whose did not fit well, statistical differences were found in two of the secondary school sample groups. Table VII shows the mean attitude scores within groups and the significance of difference between means. Mean attitude scores differed significantly at the 5% level within the forced and the experimental groups.

TABLE VII

Fit of Safety Glasses and Attitude Scores
Secondary School Sample

Group	N	Mean Attitude Score	"t"
Forced Group			
Fit well	5	130	3.6*
Did not fit well	5	101	
Control Group			
Fit well	11	121	1.98 NS
Did not fit well	3	107	
Experimental Group			
Fit well	6	123	2.6*
Did not fit well	8	101	

* Significant at .05 level
NS Not Significant

General Comments from Respondents

The study participants were availed the opportunity to express their feelings about wearing safety glasses 100% of the time in the school shop. The most repeated comment was to the effect that they appreciated having an opportunity to take part in

the study, but somewhat rebelled at the idea of wearing safety glasses 100% of the time while in the shop. One participant reported that, "They (the glasses) stopped a big piece of metal once for me so I am sold on them." A similar comment was, "The first day I had them on they stopped a piece of metal from hitting me."

It was apparent that in some cases individuals who were not accustomed to wearing eye spectacles had a great deal of difficulty in feeling at ease while wearing the safety glasses. One very negative comment was, "I did not particularly like wearing the safety glasses and they hurt my ears every time I put them on. These glasses were more bother than they were worth."

Discussion

The problem dealt with the notion that eye safety is a personal matter involving an individual's attitude toward self-preservation of his sight. Thurstone describes attitude, "As the degree of positive or negative affect (feeling) associated with some psychological object " (Edwards, 1957). In a similar manner, Guilford (1954) states, "An attitude is a personal disposition common to individuals, but possessed to different degrees which impells them to react to objects, situations, or propositions in ways that can be called favorable or unfavorable."

In this study, attitudinal change--the disposition to act in the hypothesized manner--was not significantly achieved. This is to say, the data does not support statistically a significant mean gain in favorableness of attitude toward voluntarily wearing eye protection devices 100% of the time in the school shop. The reinforcement variable, the film, "It's Up To You," as used with the experimental groups did not produce a significant difference within the samples.

As hypothesized, the attitude of the forced groups, those who had to wear the safety glasses while in the school shop, declined in favorableness but again not

significantly. Nevertheless, the decline in the mean score emphasizes the difficulty that is to be expected in attitudinal development when imposing or "mandating" action. It should be pointed out, however, the forced groups acquired a significantly higher percentage (at the .05 level) in actual eye protection while working in the school shop. Therefore, it is apparent that eye safety can be obtained through "enforcement of rules" even though the attitude toward eye safety may decline. If the mere wearing of eye safety equipment irrespective of attitude is the paramount problem, then enforcement appears to be the answer to safeguarding against eye injuries in the school shop. It was hypothesized that the voluntary use of eye protective devices would develop favorable eye safety attitudes and the wearing of the safety glasses would automatically follow. This proved not to be because the observational check indicated that the secondary school experimental group had the lowest percentage (42%) of its students wearing safety glasses throughout the study.

The film, "It's Up To You," through its depiction of an actual eye injury and the ensuing medical treatment provided a sobering effect on both the secondary school and college samples. There is even some indication that the audience should be warned before the showing so they can be prepared for the surgical scenes. It appears best to show the film in a well-ventilated room with each individual in a properly seated viewing position. A reminder that the eyes can be closed or head turned away from any scene which may appear unduly offensive to the individual seems to be in order. As impressive as this film is in providing a "shock" stimulus, its result was not significantly lasting even over the six-week interval of the study. It cannot be hoped, then, to have this stimulus carry over into one's working career. The study data suggests the film, "It's Up To You," is not a panacea to the problem of developing favorable attitudes toward eye protection, and at the best it serves as an initial shock treatment with limited longitudinal effects.

A significant relationship exists between attitude and how well the safety glasses fit. This was evident when a "t" test revealed a significant difference in mean attitude gain (at the .05 level) among those who said their glasses fit well as compared to those who indicated the glasses did not fit comfortably. To this point, then, the proper fit and comfort of eye protection devices is most important. It must be recognized that individuals who have never experienced prolonged wearing of eye spectacles need time to adjust and to become accustomed to the wearing of safety glasses.

The Likert type attitude scale, due to its length, may have worked a hardship on the study participants. Youth, especially the secondary school sample, displayed an anxiety to "get the job done" so they could commence work on their projects. In other words, the scale may not have resulted in recording the highest degree of attitude toward the wearing of safety glasses 100% of the time in the school shop. In this respect, it seems desirable to try a unidimensional type of scale or to reduce the number of items on the present scale.

The study has but measured one technique which was felt might significantly influence an attitude change in favor of wearing safety glasses in the school shop. The results suggest the need for developing additional ways in bringing about desired attitude change as evidenced by the actual wearing of eye protective devices.

Summary

This study was concerned with measuring attitudinal change toward the wearing of safety glasses 100% of the time in the school shop. It was carried on with two independent samples drawn from populations of tenth grade machine shop students and college students enrolled in an engineering machine shop course.

The design called for a control, experimental, and forced group within each sample. Participants were supplied with a pair of industrial style safety glasses or cover goggles for their personal use throughout the study. A Likert Summated Rating type attitude scale was developed for each population and administered on a pre-post test basis. The experimental groups were shown the film, "It's Up To You," as released by the National Society for the Prevention of Blindness to reinforce a brief introduction to the many hazards involving the eyes when working in a school shop. The reinforcement failed to produce statistically a significant mean gain in attitude change in the experimental groups, and the forced groups (mandated to wear the glasses) resulted in a negative non-significant mean attitude. The control groups' mean attitude scores remained almost constant.

The actual wearing of the safety glasses, as verified by daily observational checks, showed the forced groups to have the highest rate of occurrence. The college sample experimental group had the second highest rate of occurrence whereas the secondary school experimental sample had the lowest. When comparing favorableness of attitude with how well the safety glasses fit, it was found that those who reported the glasses to be comfortable had a significantly higher mean score (at .05 level) than those who reported their glasses fit uncomfortably or poorly.

The data suggests that the film falls short of being a panacea for developing a favorable and lasting attitude toward the wearing of safety glasses 100% of the time in the school shop. Any initial "surge" in attitude change apparently declines rapidly and at the end of the five to six-week period, the student was no more conscious of eye safety than he was at the beginning of the study. Study results suggest the need for utilizing supplementary techniques to augment the film, if a significant change in attitude toward the wearing of safety glasses in the school shop 100% of the time is to be achieved.

The Pennsylvania State University

FILM REACTION SURVEY

You have just viewed a motion picture on eye protection entitled, "It's Up To You." Please react to the following:

1. Should this film be shown to adult persons who work around machinery? (check one)
   - ( ) Definitely should be shown
   - ( ) Probably should be shown
   - ( ) Would make little difference
   - ( ) Probably should not be shown
   - ( ) Definitely should not be shown

2. Should this film be shown to high school students who work in the school shop? (check one)
   - ( ) Definitely should be shown
   - ( ) Probably should be shown
   - ( ) Would make little difference
   - ( ) Probably should not be shown
   - ( ) Definitely should not be shown

3. Should this film be shown to junior high school students who work in the school shop? (check one)
   - ( ) Definitely should be shown
   - ( ) Probably should be shown
   - ( ) Would make little difference
   - ( ) Probably should not be shown
   - ( ) Definitely should not be shown

4. Did you close your eyes or turn away during the showing so as not to see certain parts of the film? (check one)
   - ( ) Frequently
   - ( ) Sometimes
   - ( ) Once in a while
   - ( ) Hardly ever
   - ( ) Never

5. What do you think about using color in a film of this type? (check one)
   - ( ) Definitely should be used
   - ( ) Probably should be used
   - ( ) Would make little difference
   - ( ) Probably should not be used
   - ( ) Definitely should not be used

6. Do you think other such films should be made to point out the problem of safety in the shop? (check one)
   - ( ) Definitely should be made
   - ( ) Probably should be made
   - ( ) Would make little difference
   - ( ) Probably should not be made
   - ( ) Definitely should not be made

EYE PROTECTION STUDY

● Directions -- Please check the following items regarding the wearing of (safety glasses) (safety covers) which were supplied to you for this study. (Cross Out One)

1. These glasses or covers fit well. ( ) yes ( ) no

2. If "no" in item #1, indicate the difficulty(s).
   - ( ) a. they did not fit my nose bridge
   - ( ) b. they pinched my ears
   - ( ) c. they were uncomfortably heavy
   - ( ) d. they irritated my skin
   - ( ) e. they pinched my temples
   - ( ) f. they were difficult to adjust
   - ( ) g. in general, they were uncomfortable
   - ( ) h. other_____

3. The lenses were satisfactory. ( ) yes ( ) no

4. If "no" in item #3, indicate the difficulty(s).
   - ( ) a. the lenses scratch too easily
   - ( ) b. the lenses occasionally fog up
   - ( ) c. the lenses made my eyes water
   - ( ) d. other_____

5. The style of safety glasses or covers was satisfactory. ( ) yes ( ) no.

6. If "no" in item #5, indicate the difficulty(s).
   - ( ) a. the side shields prevented side vision
   - ( ) b. they were too difficult to carry when not in use
   - ( ) c. I didn't look good while wearing them
   - ( ) d. other_____

● Directions -- Please write in your own words how you feel about the study that was conducted.

_____

_____

_____

_____

_____

Industrial Education Department
The Pennsylvania State University

DAILY EYE SAFETY CHECK

Teacher--please fill out this form once each day during the eye safety study. Do not take the count at the same time each day but make it at random times during the shop period. Under "remarks" please state situations in which students are not wearing glasses.

Date	No. Present	No. wearing safety glasses and/or covers	Remarks

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